REMARKS

This communication is a full and timely response to the final Office Action dated December 23, 2010. Claims 1, 4, 6-10, and 14-18, 21, 23, and 24 remain pending, where claims 5, 11-13, 19, and 20 were previously canceled. By this communication, claims 1, 9, 10, 18, and 21 are amended.

In numbered paragraph 3 on page 2 of the Office action, claims 1, 4, 6-10, 14-18, and 21 are rejected under 35 U.S.C. §112, second paragraph for alleged indefiniteness. Applicant respectfully traverses this rejection.

With regard to claim 21, the Examiner's concerns related to antecedent basis have been addressed through the amendment.

Regarding independent claim 1, U.S. Patent No. 6,587,263 ("the '263 patent), which is discussed in the Background section of Applicant's disclosure, describes an optical solar reflector (OSR) that includes, among other features, a radiative layer 108. The radiative layer 108 is described as being chosen to have "<u>low</u> absorbency or electromagnetic radiation", which "avoids heating the spacecraft due to absorption of this energy" (Emphasis added, col. 4, lines 3-19). The radiative layer 108 also has <u>high</u> absorbency and emissivity in an infrared wavelength range. Absorbency (α) values in an electromagnetic range of 200 nm to 2500 nm and emissivity (E) values in an infrared range of 2.5 μm to 25 μm were determined through tests (See Table A below).

TABLE A

Alpha and emissivity values of PECVD coating on Ag

Coating	Thick (μm)	α	E	α/E
SiO_2	12.8	0.184	0.811	0.226
$SiO_{1.14}N_{0.57}$	16.7	0.073	0.854	0.085
$SiO_{0.8}N_{0.8}$	16.8	0.070	0.857	0.082
$SiO_{0.5}N$	16.5	0.068	—	—
SiO_3N_4	13.6	0.083	0.847	0.098
standard	50	0.075	0.846	0.088

As shown in the table, low absorbency can be exemplified through the values exhibited in the "α" column. Likewise high emissivity is shown through the values in the "E" column.

A transmissive value of a material quantifies the amount of incident light that passes through the material. More specifically, the transmissivity measures the percentage of incident light that passes through an object. Transmissivity is related to absorbance such that a material having high transmissivity will have low absorbance and vice versa. Thus, the transmissivity can be determined from the absorption values.

While Applicant's disclosure does not expressly define values in association with high and low absorbency and emissive characteristics and high transmissive characteristics, given the knowledge afforded one of skill in the art, which is evidenced at least through the disclosure of the '263 patent and the arguments provided in Applicant's previous response, the meaning of these terms would have been known at the time of Applicant's filing.

Furthermore, the Examiner alleges that Applicant's recitation of metal-free is indefinite because silicon nitrides and silicon oxides which are metal-based are substituted. The Examiner fails to appreciate, however, that one of sill in the art would understand that semiconductor and metalloid materials are not considered to be metals. Thus, a film that contains these materials is a metal-free film.

Based on the discussion above, independent claim 1 and its corresponding depending claims are definite such that withdrawal of this rejection is respectfully requested.

In numbered paragraph 8 on page 4 of the Office Action, claims 1, 4, 6, 9-10, 14, and 21 stand rejected under 35 U.S.C. §103(a) for alleged unpatentability over *Rogers et al* (U.S. Patent No. 4,479,131) in view of *Jonza et al.* (U.S. Patent No. 5,882,774) with evidence from *3M™ Radiant Mirror Film VM2000F1A6 Product Sheet* ("3M Product Sheet"). Applicant respectfully traverses this rejection, as the combination of the applied references does not establish a *prima facie* case of obviousness as alleged.

As shown in Figs. 1-5, Applicant describes an exemplary antenna having an active face on which a thermal control film is disposed. The thermal control film has a polymeric multi-layer structure that includes a set of interference filters. The layer structure of the thermal control film includes a stack of alternating high and low refractive index dielectric films. The thermal control film has a low absorbency of solar radiation, and a high absorbency and emissive characteristic in the infrared wavelength range 2.5μm to 50μm, which corresponds to the spectrum of heat generated by the high frequency circuits of the antenna array. The film also exhibits a high transparency to the microwave frequencies, typically 1 to 30 GHz.

Independent claim 1 broadly encompasses the above-described features. Particularly, independent claim 1 recites among other features

> an active face, at least one radiating element for transmitting radio frequency (RF) signals via the active face, and a metal free thermal control film covering the active face.

Rogers discloses a thermal shield positioned in front of an antenna reflector. The shield comprises a semiconductor optical coating and a capacitive grid on a substrate. The shield is provided on a passive reflector to focus signals onto a receiver (col. 2, lines 6-11; Fig. 1). The optical coating is designed such that not all solar energy will be absorbed by the coating on the sun side of the shield and to prevent heating of the shield. The optical coating also provides for the shield radiating heat, resulting from the absorbed solar energy, back into space (col. 2, lines 60-68). The combination of a capacitive aluminum grid and the optical coating/film provide the desired emissive characteristics, as the optical coating is provided to reduce solar transmittance and the capacitive grid stops the solar radiation (col. 4, lines 18 to 23).

Rogers does not disclose, however, an antenna having an active face, and a thermal film being provided on the active face, as recited in Applicant's claim 1. One of skill in the art would have understood that based on Applicant's disclosure, an active face of the antenna includes radiating elements such as RF electronic circuitry.

Moreover, the coating described in *Rogers* is only disclosed with reference to having high thermal emittance in the infrared radiation range corresponding to absorbed solar energy. Rogers fails to provide any guidance concerning how the coating would handle infrared radiation, incident from the reflector side, in the IR

spectrum range (2.5um to 25um). This energy range corresponds to excess heat generated by the electronic devices within the antenna itself. Based on the configuration of the coating and the lack of discussion in *Rogers*, it appears that IR energy resulting from the electronic devices would be trapped by the shield. Consequently, the coating of *Rogers* does not appear to be suitable for an active face that comprises radiating elements as is embodied in Applicants' claims.

Jonza discloses an optical film having a multilayered polymeric sheet with alternating layers of polyethylene naphthalate and a polymer that is a reflective polarizer or mirror. The multilayer construction as shown in Fig. 1b includes alternate low and high index thick films having no tuned wavelengths or bandwidth constraints. The preferred multilayer stack ensures that wavelengths that would be most strongly absorbed by the stack are the first wavelengths that would be most strongly absorbed by the stack.

Jonza also discloses that the properties of the film can be modified by stretching the film.

However, neither *Jonza* nor the *3M Product Sheet* provides motivation to modify a film such that it can be provided on an active face in order to let RF signals out, along with the waste heat, while also minimizing the heat generated by incident radiation from the sun. Moreover, these documents would not have guided one of skill in the art with regard to modifying the shield of *Rogers* into a film that can be used on an active face. The skilled artisan would not have looked to modify the shield of *Rogers* to emit IR radiation as recited in Applicants' claims because the shield is provided on a passive reflector and would not be required to emit heat generated by active components within the antenna.

In summary, *Rogers*, *Jonza*, and the *3M Product Sheet* when applied individually or collectively fail to disclose or suggest every feature and/or the combination of features recited in Applicant's claims. For these reasons and those discussed in detail above, a *prima facie* case of obviousness has not been established. Withdrawal of the rejection to claims 1, 4, 6, 9-10, 14, and 21 is respectfully requested.

In numbered paragraph 12 on page 9 of the Office Action, claims 7, 8, and 15-18 are rejected under 35 U.S.C. §103(a) for alleged unpatentability over *Rogers* in view of *Jonza* with evidence provided by *3M Product Sheet*, as applied to claims 1 and 14 above, and further in view of *Iacovangelo et al* (U.S. Patent No. 6,587,263). Applicant respectfully traverses this rejection.

Claims 7, 8, and 15-18 variously depend from claim 1. By virtue of this dependency, these claims are distinguishable over the applied combination of references because *Iacovangelo* fails to remedy the deficiencies of *Rogers*, *Jonza*, and *the 3M Product Sheet* identified above. Moreover, the subject claims are deemed to be further distinguishable over the applied references due to the respective additional features recited therein. Withdrawal of this rejection, therefore, is respectfully requested.

Independent claims 23 and 24 are newly added. These claims encompass at least those features discussed above that distinguish independent claim 1 over the prior art of record. As a result, Applicant believes that claims 23 and 24 are likewise distinguishable. Favorable consideration of these claims is requested.

CONCLUSION

Based on the foregoing amendments and remarks, Applicant respectfully submits that claims 1, 4, 6-10, 14-18, 21, 23, and 24 are allowable and this application is in condition for allowance. In the event any issues adverse to patentability remain and/or the Examiner believes that further prosecution would benefit from a personal interview, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: March 23, 2011

By: /Shawn B. Cage/
Shawn B. Cage
Registration No. 51522

Customer No. 21839
703 836 6620